Chapter 5: Great Lakes

Wisconsin's 1,017 miles of Great Lakes shoreline provide a vast reservoir of fresh water and much of the special character of the state. Rugged Great Lakes bluffs provide exceptional recreational opportunities; commercial fishing and shipping; and a host of additional aethestic, ecological, biological and economic values. About a third of our state's 11 million acres of land and about 10,122 river miles drain to Lakes Superior and Michigan. Along this shoreline, however, resides the highest density urban development and most of the state's industry.

Wisconsin has long recognized the value of its unique resources and has established criteria to help protect waters draining to the Great Lakes. In partnership with other state, national and international efforts Wisconsin has committed significant resources to help protect and restore the water quality of all the Great Lakes. In 2004, Governor Doyle made a commitment to the Great Lakes by establishing the Office of the Great Lakes within the WDNR. This office will provide targeted resources to support the complex resource work needed to protect, restore and maintain the quality and quantity of water, habitat and aquatic life that is integral to our state's prosperity and culture.

Lake Michigan

Lake Michigan, the second largest of the Great Lakes, covers 22,300 square miles and has a retention time of 99 years. It is the only Great Lake entirely with the borders of the United States. Lake Michigan is an important national resource supplying drinking water for 10 million people, providing important sport and recreational fishing opportunities and valuable recreational uses. It has also experienced profound changes in its aquatic ecosystem over the last 140 years and is threatened by toxic pollutants that bioaccumulate in the food chain and persist in the environment. The Lake Michigan ecosystem is stressed through the loss of habitat, declines in biological diversity, the presence and spread of multiple aquatic and terrestrial invasive species, and the presence of persistent bioaccummulating toxic substances, as well as excess sediment and nutrients.

Lake Superior

Lake Superior provides a vast resource of freshwater covering 31,700 square miles. It is the largest freshwater lake in the world by surface area -- its size could hold the water present in all the other Great Lakes along with three additional Lake Eries. Historically, Lake Superior has not experienced the same level of development, urbanization and pollution as the other Great Lakes. And, while this is cleanest and healthiest of the Great Lakes, toxic bioaccumulating substances are present in its food chain, as they are ubiquitous in the environment. These substances can be transported long distances in the atmosphere and end up in the lake. Because of its long retention time (191 years), pollutants entering Lake Superior can remain in the lake for over a century before draining to the lower Great Lakes.

Great Lakes Charter — Annex 2001

The Great Lakes Charter Annex was signed June 18, 2001. The original Great Lakes Charter (1985) set guiding principles for the U.S. governors and Canadian premiers to maintain and strengthen the Great Lakes ecosystem. The Annex contains six directives to guide the governors and premiers toward their goal of an improved Great Lakes region. The Annex calls for developing a new set of binding agreements, focusing on quantity issues; developing a broad-based public participation program; establishing a new decision making standard; a project review under the Water Re-

sources Development Act of 1986 (amended 2000); developing a decision support system that ensures the best available information; and further commitments to implementing and monitoring the Charter and Annex.

The Council of Great Lakes Governors is coordinating the implementation of Annex 2001. A Water Management Working Group has been created to complete this task. Each state and province had representatives appointed to this group by their respective governors and premiers.

Additionally, an advisory committee which was formed to provide an opportunity for public input, will be comprised primarily of regional organizations from industry, environment, utilities, etc.

Wisconsin supports the development of a standard that focuses on real threats to the Great Lakes, while not making it impossible to access lake water in necessary situations. A uniform policy needs to be agreed upon which will put to an end to debates between parties due to the process being unclear or key terms lacking clarity. The goal of the current agreement is to initiate a broad public dialogue during the 2004 summer months. Public input will help the regional leaders determine which course of Great Lakes water quantity management to pursue.

Assessment Summary

Resources were not available to provide updated asessment data for the 2002-04 reporting period. Updated figures will be available in the 2006 report.

During the next few years, several key activities will be needed to meet this reporting goal: resource allocation to review and develop or update where necessary assessment protocols for Great Lakes shoreline. Assessment protocols that need to be updated or developed for Great Lakes shoreline miles include: fish and aquatic life use, recreation, public water supply, and fish consumption. Once these protocols are developed, they can be applied to the resource and documented in the WADRS system.

Great Lakes Ecosystem Restoration

Key Issues

Wisconsin's involvement in addressing key Great Lakes issues demonstrates our commitment to the restoration of these valuable resources. Great Lakes activities can be categorized as:

- **River Restoration/Dam Removal**—Restoring free-flowing streams and providing additional habitat for anadromous fishes. Coupled with dam removal, projects often involve assessment and remediation of contaminated sediments accumulated above the dams.
- **Habitat Restoration**—Improving habitat in tributary streams for spawning and nursery areas and enhancing habitat with a large-scale or landscape level approach.
- **Pollutant Reduction and Prevention**—Reduction of critical pollutants to levels identified in TMDL analyses for the lakes. Sediment remediation, reduction of atmospheric loadings and nonpoint source controls are needed to eliminate fish consumption advisories. Problematic Great Lakes beach issues such as the presence of *Cladaphora*, a filamentous algae, and pathogens are the focus of new studies and management actions.
- **Exotic Species**—Prevent and where possible control populations of exotic species from becoming more established in the Great Lakes. These issues are regional to international in scope and must be dealt with at a national level to ensure that consistent across the board measures are employed for the management of exotic species.

Identification of these key areas has allowed local projects to move forward. However, some particularly difficult issues, such as regional atmospheric deposition of mercury, require coordination of regional solutions from U.S. EPA and other national partners.

Great Lakes Projects

Many Great Lakes projects are implemented through the Great Lakes Protection Fund, the Coastal Zone Management Program, the Lake Superior Binational Program and Lakewide Management Plan (LaMP), and the Lake Michigan LaMP. The completion of the LaMPs for both Lakes Superior and Michigan has accelerated the development of implementation strategies. Interagency cooperation and commitment of the LaMP workgroups have resulted in moving forward with many projects designed to restore or protect the beneficial uses of the Great Lakes ecosystem as outlined in the plans. Likewise, work to alleviate problems identified in Remedial Action Plans is also underway for the state's five areas of concern at Duluth/Superior; Marinette, WI/ Menominee, MI; Green Bay; Sheboygan; and Milwaukee. On a two-year basis, either through the State of the Great Lakes Ecosystem Conference (SOLEC) process or the International Joint Commission (IJC) biennial meeting, the governments should provide updates on Great Lakes Project implementation through LaMP or RAP reporting.

Cladophora blooms on Lake Michigan Coast

Cladophora, a filamentous green algae, has increased its presence on Wisconsin Lake Michigan beaches, as well as Lake Ontario and Lake Erie beaches in other states. *Cladophora* grow attached to hard substrate on the nearshore lake bottom, but break off during storm events or summer "die off", washing onto beaches and where they decay. In some beach locations, windrows of decaying algae produce noxious odors and are potential incubators for harmful bacteria.

Cladophora is a native species that was previously seen at nuisance levels in the 1960's in the Great Lakes due to high phosphorus inputs. Phosphorus loads to Great Lakes tributaries declined in the 1970's due to tighter controls on point sources and a ban on phosphorus in laundry detergents and other restrictions.

Causes of the increased presence of *Cladophora* are not well understood; however increased water clarity, nutrient availability, and water temperature, combined with lower lake levels are key factors.

The presence of zebra mussels in Lake Michigan has dramatically increased water clarity, providing deeper light penetration and expanding the suitable range for *Cladophora*. In addition, zebra mussels concentrate available phosphorus in the nearshore through the deposition of feces, which may be fertilizing *Cladophora* beds.

Research by UW-Milwaukee indicates phosphorus loads to the Milwaukee River, for example, have increased in recent years. Other Lake Michigan tributaries are likely experiencing similar trends. Monitoring major tributaries by WDNR and the UW-Milwaukee will investigate possible changes in phosphorus loads.

Lower lake levels may also contribute to the problem by increasing areas suitable for *Cladophora* growth. Surveys of the Lake Michigan coastline are also scheduled to better understand the distribution of *Cladophora* along the coast.

Funding Sources

Projects designed to improve and enhance the resources of the Great Lakes and the goals and objectives of the RAPs, LaMPs and Binational Program are supported by federal grants from U.S. Environmental Protection Agency, the Army Corps of Engineers, the Coastal Management Program and the Wisconsin share of the Great Lakes Protection Fund. These funds are provided to individuals, universities, local and state government and groups to implement the projects that further the goals of preserving and enhancing the Great Lakes. A new source of funding will become available to states in the coming years, the Great Lakes Legacy Fund, which will provide resources for contaminated sediment and other types of remediation work in the Great Lakes.

Project Descriptions

River Restoration/Removal of Dams

Several dam removal projects on the Milwaukee and Sheboygan Rivers, tributaries to Lake Michigan, have experienced substantial progress in the past two years. These projects have included habitat improvement goals to reestablish fish and wildlife. Additional dam removal projects are in the planning or implementation stages within the basin (see the 2002 Water Quality Report to Congress). In the Lake Superior Basin, removal of the Orienta dam on the Iron River has been completed.

Habitat Restoration

In the Lake Michigan Basin, projects are underway for aquatic life and habitat enhancement in Green Bay through the Cat Island Chain Restoration Project and the Green Bay Marina Project.

Several projects are also on-going in the Lake Superior Basin. The Northern Pike habitat restoration project involves installing buffer strips on low order streams. Eighty-three (83) acres of buffers, or 12 miles of stream buffer, have

been installed along parts of Trout Creek, Fish Creek, and the upper reaches of the Suamico and Little Suamico River watershed. This joint effort involves Outagamie and Brown Counties and the Oneida Nation Reservation.

The Manitowoc Soil and Water Conservation Department (federal agency) and the Kewaunee County Land Conservation Department (local) are reducing sediment and phosphorus loading to the West Twin River and East Twin River watersheds through buffers and wetland restoration.

Special efforts are underway to restore Lake Sturgeon and Lake Superior brook trout populations. Buffer strips were installed for water quality and habitat improvement along waterways. In Brown County along Baird Creek approximately 27 acres, encompassing 3.5 miles of stream buffers, were installed between 2002-2003. These efforts will reduce nutrient loading to the stream by 69 pounds of phosphorus, 38 pounds of nitrogen and 71 tons of sediment per year.

Efforts are underway to restore lost wetlands in several basins adjacent to the Great Lakes. Approximately 25 acres of wetlands were restored and spawning habitat was improved in a project in the City of Mequon along Trinity Creek, a tributary to the Milwaukee River. The wetland resoration will provide spawning area for northern pike as they move upstream on the river. The restored area also helps abate flooding along the creek and provides a natural recreational area.

In the Lake Superior basin the WDNR is working with several other agencies and the public to pursue a watershed-based strategy to reduce peak flows that contribute to streambank erosion and habitat degradation in tributaries. Among the pilot projects underway, WDNR, U.S. Geological Survey (USGS) and UW-Madison Engineering School are using submerged vanes to stabilize erosion on steep sandy slopes on North Fish Creek, a tributary to Chequamegon Bay. Increased runoff from agriculture and logging practices on areas with clay soils has increased flood magnitudes and the erosion transport of the streams. The creek's sediment load largely originates from erosion on 17 large bluffs. North Fish Creek contains important recreational fisheries limited by the loss of aquatic habitat from deposition of sediment on spawning beds. Currently submerged vanes are installed in the streambed at two sites on Fish Creek in Ashland. These vanes are designed to divert the water's energy forces away from the eroding bluff thus reducing sedimentation to the stream. Controlling erosion will improve the streambed, enhancing spawning of migratory fish from Lake Superior. In 2004, a third site will be installed. Available data show the stream is moving away from the eroding bluff, which in turn is decreasing sediment load to the stream.

WDNR is pursuing the use of the Conservation Research Program's continuous buffer sign-ups for tributary streambanks to help restore and protect important spawning areas for Great Lakes fish. The use of buffer strips along waterways helps improve water quality by trapping sediments and nutrients, as well as providing habitat for aquatic and terrestrial species. WDNR is working with counties, NRCS and other groups to combine resources and information to work with farmers and landowners to have more buffer strips installed, especially in critical Great Lakes watersheds.

Pollutant Reduction and Prevention

Sediment Remediation

Historic discharges have left a legacy of contaminants that have restricted human consumption of Great Lakes fish. Sediment remediation involves big projects with expensive solutions but as new ideas and approaches are being advanced and through collective public-private efforts, progress is being made. Projects include Hayton Millpond, Newton Creek and Hog Island Inlet, and the Fox River (see Contaminated Sediment Projects, Chapter 3).

Mercury and Other Persistent Chemical Reduction

Reduction of mercury and other persistent chemicals from the environment through proper disposal and education is a high priority in improving the water quality of lakes and streams. These efforts have included Agricultural Clean Sweeps in cooperation with the Department of Agriculture, Trade and Consumer Protection (DATCP) to removed hundreds of pounds of agricultural chemicals from the environment in the Great Lakes Counties by offering farmers a no cost option for proper disposal of their unused farm chemicals. Additional grants were offered to counties in the Great Lakes basins through the Great Lakes Protection Fund.

In 2002, over 279,714 pounds of chemicals were collected in 36 counties participating in clean

sweeps (21 counties were in the Great Lakes Basin). In 2003, a total of 36 counties participated in the agricultural clean sweep, 16 of these counties are in the great lakes basins and collected 282,746 pounds of chemicals. Similar programs for household hazardous waste are also offered around the state. In particular, a grant offered a mobile household and agricultural waste clean sweep program in the Lake Superior basin. This program covers a four county area and provided a mobile service that traveled to various communities to pick up chemical waste. On-going efforts by local governments, school districts and counties have increased the awareness of the impact of various household products, chemicals, and open burning have on the environment.

Mercury Reduction, Focus: Lake Superior

WDNR, UW – Water Resources Institute, and Lake Superior State University (Sault Ste. Marie, MI) continue to work on a comprehensive mercury study of Lake Superior. With financial support from USEPA and the Wisconsin Sea Grant Institute, the study is revealing the biogeochemical cycle of mercury in the open waters of Lake Superior and its tributaries. Water, plankton, and sediments were sampled for total and methyl mercury at sites throughout the lake. Total mercury concentrations were consistently below 1 ng/L throughout the lake. The methyl mercury concentrations were around 5 pg/L at both the surface and deep waters. Tentative results suggest that the sediments of Lake Superior are not a source of biogenic methyl mercury production. Surprisingly, however, methyl mercury has been measured in wet deposition around the lake. Future efforts will be made to evaluate the dynamics of methyl mercury inputs from tributaries to the lake and interactions at the mixing zones with the near-shore waters.

Exotic Species

Projects funded through the Great Lakes Program to control exotic species from spreading to uninfested waterbodies have included educational outreach projects to inform the public how their actions impact the spread of exotic species. These projects, aimed at changing boaters' behavior to clean their boats before leaving the launching sites, include Public Service Announcements (PSA) broadcast during sporting events, a special publication in the Natural Resources Magazine on the impacts of exotics on our fisheries, tourism and local economy, and a video to be used by sporting groups, lake associations and others at meetings and special events. Specific control structures were also funded, like the construction of lamprey barriers on the Brule River in the Lake Superior Basin.

Coastal Zone Program

Wisconsin is required to implement a nonpoint source management program under Section 6217 of the 1990 Coastal Zone Act Reauthorization Amendments. The program requires enforceable policies to regulate compliance with USEPA for six categories of nonpoint source activities including agriculture, urban, forestry, wetlands, hydromodifications and marinas. Specific management measures involve programs administered by WDNR; DATCP, the Department of Commerce; and the Department of Transportation. The management area includes all the Great Lakes drainage area in Wisconsin except the Wolf and Upper Fox Basins upstream of the outlet of Lake Winnebago. Wisconsin has many activities in this area, including 22 priority watershed projects. Nearly all of the urban areas will come under U.S. EPA's recently promulgated Storm Water Phase 2

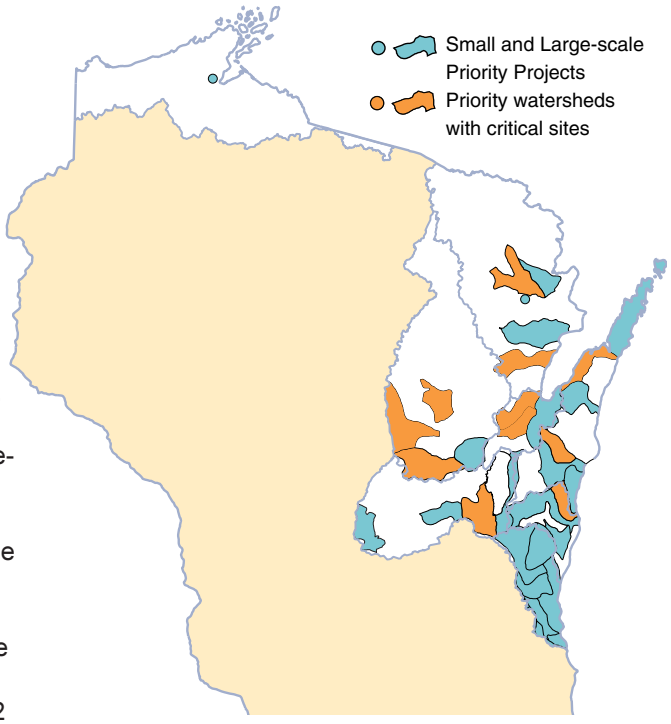

Figure 28. PWS projects in Great Lakes Basin

regulations. Forestry activities are managed through use of best management practices contained in the WDNR published manual. Wetland protection and regulation of hydromodifications are statewide programs.

Lake Michigan Lakewide Area Management Plan (LaMP)

The Lake Michigan Lakewide Management Plan (LaMP), updated in 2004, outlines a vision, goals and ecosystem objectives for Lake Michigan. The following are broad goals identified in the report:

- All persons can eat any fish.
- All persons can all drink the water.
- All persons can swim in the water.
- All habitats are healthy, naturally diverse and sufficient to sustain viable biological communities.
- Public access to open space, shoreline and natural areas is abundant and provides enhanced opportunities for human interaction with the Lake Michigan ecosystem.
- Land use, recreation and economic activities are sustainable and support a healthy ecosystem.

For each of these goals, LaMP 2000 includes indicators and monitoring recommendations for lake ecosystem health, status, and stressor sources and loads, and recommends actions or “next steps” for remediation, restoration or other necessary work.

Lake Michigan LaMP Update

Wisconsin has worked with USEPA, other states, and other interested parties to revise the LaMP. Updates include a standardized procedure for reviewing the list of ‘critical pollutants’ included in LaMP 2000. Tools have also been developed to better identify habitat data and land use management resources. Tools include information regarding funding sources for best management practices, brownfields redevelopment, prevention and control of air pollution, water restoration work, and aquatic habitat conservation and restoration.

In addition, the LAMP updates identify specific actions that both support the goals of the LaMP and that are consistent with the Great Lakes Strategy, an overall framework with goals and objectives for management of the Great Lakes. For example, a proposed action in the current draft indicates that a TMDL Strategy will be developed for Lake Michigan, which is consistent with the USEPA’s Great Lakes Strategy.

Issues of major concern include the level of contamination in fish and the ultimate goal of removal of consumption advisories. Because advisories for mercury, for example, are in place largely due to atmospheric deposition, meeting this goal would require a national and international effort. Also, more knowledge, funding and additional resources are needed to fully address contaminated sediments, program coordination, ecological habitat and pathogen monitoring.

Lake Superior LaMP and Bi-National Program

WDNR is one of several partner agencies in the Binational Program to Protect and Restore the Lake Superior Basin (“Binational Program).” This program was formed in 1991 by agreement signed by the governors of Wisconsin, Minnesota, Michigan, and by representatives of the USEPA, Environment Canada and the Province of Ontario. Its key features include a zero discharge demonstration program for Lake Superior and a broad program of coordinated ecosystem management. The Binational Program is often held up as a model of inter-jurisdictional resource management.

The Lake Superior Lakewide Management Plan (LaMP) reports progress on the Lake Superior Binational Program as well as the Great Lakes Water Quality Agreement. Stages 1 and 2 of the Lakewide Management Plan for Lake Superior came out in 1995 and 1999 respectively. These stages focused primarily on chemical pollutants. In 2000, a more comprehensive LaMP was developed, which includes strategies for pollutant reductions as well as strategies addressing issues of habitat, aquatic and terrestrial communities, human health, and sustainability. Progress reports and plan updates are produced every two years. LaMP 2002 and LaMP 2004 are available on the EPA Great Lakes National Program Office website.

The Wisconsin DNR is working with Lake Superior basin communities and citizen groups on watershed and habitat protection efforts and community-based pollution prevention. Another major implementation push in Wisconsin is to pursue resources for contaminated sediment remediation. The St. Louis River and estuary is the largest U.S. tributary to Lake Superior, and the only Area of Concern in Wisconsin waters of Lake Superior. Many of the implementation projects underway in Wisconsin serve to meet the goals of the St. Louis River Remedial Action Plan as well as the Lakewide Management Plan for Lake Superior.

Zero Discharge Demonstration Program

The Lake Superior Zero Discharge Demonstration Program is unique in the Great Lakes. The goal is to elminate sources of the “nasty nine” critical pollutants in the Lake Superior basin by the year 2020. The key to zero discharge and zero emission is pollution prevention. This is an experimental program to see if we can find ways to prevent these chemicals from being used in processes or products to prevent their release in the Lake Superior Basin. The nine targeted pollutants are mercury, PCBs, dioxin, hexachlorobenzene, octochlorostyrene, aldrin/dieldrin, chlordane, DDT/DDE, and toxaphene. These pollutants are toxic, bioaccumulative, and persist in the environment.

Why zero discharge for Lake Superior?

Lake Superior is vulnerable to toxic substances. Water stays in the Lake for over 150 years, on average. Although it is the cleanest of the Great Lakes, toxic pollutants accumulate in Lake Superior’s fish and wildlife. People feel strongly about protecting the Lake Superior basin, one of the world’s great places. The idea of a Lake Superior “zero discharge” demonstration came from public support in the 1980s. The 1991 Binational Program agreement stresses voluntary pollution prevention, but acknowledges that enhanced controls and regulations may be necessary.

Community Pollution Prevention

Many communities around the basin are working on ways to prevent pollutants, particularly mercury, from getting into the Lake Superior environment. Consumer and commercial products can be a significant source of mercury. Mercury-containing products can include thermometers, switches, dental amalgams, thermostats, button batteries, and fluorescent lamps. Industrial raw materials can also contain unwanted mercury. The City of Superior, Wisconsin has become a regional leader in community mercury reduction, working with Ashland, the Red Cliff Band of Lake Superior Chippewa, and with other Lake Superior communities in the U.S. and Canada. Key recent pollution prevention projects include the following

Superior set up a fluorescent bulb recycling program where local hardware stores provide collection facilities and local industries (Murphy Oil USA and Superior Water Light and Power) provide funds for bulb recycling.

The Cities of Superior and Ashland set up a program with auto dealers to replace mercury switches in vehicles before they leave the lots. The auto dealers display posters and flyers advertising their participation.

Superior and one of its major industries, the Murphy Oil refinery, are developing a plan to eliminate the use of mercury and PCB containing equipment at the refinery. The project includes development of a purchasing policy and project outreach that can be used by other industrial facilities. The Northwest Wisconsin Mercury Free Schools program has reached 85 schools. City of Superior staff presents programs to all age school groups. Schools pledge to remove mercury products and elemental mercury. The program includes technical assistance and facility audits. Northwest Wisconsin Regional Planning Commission collects the mercury devices and other hazardous waste. Thousands of mercury items and hundreds of pounds of mercury have been collected through this program.

City of Superior offered Dental Office Best Management Practices workshops to all Douglas County dentists. City of Superior and City of Ashland pollution prevention project staff have now visited most of the dental offices in the basin in Wisconsin to present training in best management practices.

Wisconsin agencies and individuals developed and produced poster displays on Lake Superior

issues including mercury and burn barrels. The posters were used at county fair displays during the summer of 2002 and are placed in several locations including the Northern Great Lakes Visitor Center.

The Red Cliff Band of Lake Superior Chippewa Reservation has hired a mercury elimination coordinator to work with the community on mercury reduction and burn barrel projects. A June 2003 community workshop kicked off the project, which includes a radio show that combines music and environmental messages on the Red Cliff radio station.

The Town of Delta in Bayfield County, Wisconsin investigated mercury levels in soil at their abandoned town dump and hired a contractor to develop an erosion control plan at the site, which sits on a tributary to Lake Superior.

In 2002 Ashland, Wisconsin passed an ordinance banning the sale of products containing over 50 mg of mercury (with the exception of dental amalgam). The ban does not apply to fluorescent lights since they contain less than 50 mg mercury. Ashland's ordinance also requires mercury containing devices to be removed from buildings. Superior, WI banned fluorescent lights from landfills in 2002. The city of Ashland and Douglas County had banned the sale of mercury thermometers in 2001.

Hazardous Waste Collections: household, agricultural, small business

In Wisconsin's Lake Superior counties, collections for hazardous waste from households, small businesses, and agricultural operations is conducted through a mobile collection program operated by Northwest Wisconsin Regional Planning Commission. In 2002, the program expanded to provide "milk run" collections for small businesses to make proper disposal of hazardous waste more affordable in this rural area. The community based pollution prevention projects in the basin, including the Northwest Wisconsin Mercury Free Schools, utilize this collection program. The collection program has been funded through federal, state, and county government.

Table 9. Pesticides Collected in WI Lake Superior Counties by Northwest Cleansweep Program

Dates of Collection	Chlordane	DDT	Silvex/ 2-4D/ 2,4,5T	Total Pesticides[1]
Kg. collected (99-03)	39	36	89	8,682

Data from the Northwest Wisconsin Regional Planning Commission compiled by the Wisconsin Department of Natural Resources for Ashland, Bayfield, Douglas and Iron Counties.

Dioxin – A Burning Issue:

Burn barrels or backyard garbage burning is a continuing source of dioxin emissions in the rural Lake Superior basin. This practice produces dioxin that enters the environment and human food sources, posing health risks. Wisconsin Environmental Health Association and Wisconsin Department of Natural Resources produced the *Air Defenders: The Quest for Clean Air,* an educational program about open burning, air quality and asthma for children 10 years and older. The kit includes a CD of an interactive education game, posters, brochures, a WDNR video called *Give Burn Barrels the Boot* and a CD with music lyrics for songs such as *The Burn Barrel Blues*. This material is being used widely throughout the Lake Superior basin. Northwest Wisconsin Regional Planning Commission is developing a burn barrel education video for local officials.

Industry and Economic Changes

Elsewhere in the Lake Superior basin, facility closures in the mining sector resulted in reduced mercury emissions in the basin, but at a large economic cost to the region. Wisconsin has seen the closure of forest product industry facilities in the Lake Superior basin in recent years. Wisconsin's Lake Superior basin is facing growing development pressures as it becomes increasingly an area of second homes and recreational property. Sustainability is an important issue for the economic and environmental health of the Lake Superior region.

Continuing Challenges

Long-range transport of pollutants in the atmosphere

The zero discharge demonstration program focuses on air emissions, water discharges, and the use or formation of the nine critical chemicals within the Lake Superior drainage basin. However, sources outside of the basin greatly affect Lake Superior. Lake Superior with its large surface area receives a relatively high deposition of airborne toxics. Actions on a national and international level have an extremely important role in protecting Lake Superior. Actions on a state-wide basis are also important for protecting Lake Superior.

Contaminated Sediment and Stormwater: Sources of Other Critical Pollutants:

In addition to the nine pollutants included in the Lake Superior Zero Discharge Demonstration Program, the LaMP process identified other critical pollutants for Lake Superior which impair beneficial uses. Although these critical pollutants are not slated for zero discharge, the goal is pollutant reduction so that beneficial uses are restored. Polynuclear Aromatic Hydrocarbons (PAHs) in particular cause multiple impacts in the Lake Superior basin. The presence of these pollutants in contaminated sediment and stormwater runoff is important to the Lake Superior ecosystem because they impact its most biologically productive region.

Lake Superior has a narrow rim. Less than 5 percent of its area is comprised of shallow nearshore area and embayments, which is a lake's most biologically productive area. Most species of Lake Superior fish use the nearshore waters for some critical life stages. Unfortunately, these nearshore and embayments are also the areas most affected by contaminated sediment and stormwater runoff carrying contaminants from industrial and developed areas. Considerable funding is needed to clean up contaminated sites and restore this important aquatic habitat.

In the St. Louis River Area of Concern, WDNR is working with partners to pursue resources for clean up at the Newton Creek / Hog Island inlet site in Superior. In 2003, most of Newton Creek's contaminated sediment and floodplain soils were removed. The ultimate goal is to restore this area of valuable shallow water habitat of Superior Bay (see Chapter 3: Contaminated Sediment).

WDNR, U.S. EPA, and responsible parties continue to investigate the Ashland – Waterfront Superfund site in Ashland, Wisconsin. Groundwater contamination and PAH contaminated sediment in a ten- acre area of the Ashland waterfront result from historical operation of a coal gasification plant. The site includes high concentrations of PAHs in bottom sediments and degraded aquatic habitat off the City of Ashland's Kreher Park in Chequamegon Bay. The contamination originates from the on-land location of a former manufactured gas plant (see Chapter 3: Contaminated Sediment).

The Lake Superior Stormwater Project

In 1993 to 1995, the Lake Superior Binational Program engaged in a project to investigate the importance of stormwater as a pollutant source in the Lake Superior Basin. Most urban storm runoff was delivered to the lake untreated, by way of ditches and storm sewers that flow into the lake or to tributary streams. This project was a partnership of Wisconsin, Minnesota, Michigan, the U.S. Geological Service and U.S. Environmental Protection Agency. The project estimated the amounts of stormwater pollutants entering Lake Superior, developed best-management practices for reducing contaminated runoff from bulk storage piles, conducted an information campaign about stormwater pollution, and assisted communities in stormwater planning. Samples of water from rain and melting snow were taken from streets, rooftops and storm sewers. Heavy metals and PAHs in storm sewers were typically at concentrations exceeding the allowable limits in point source discharges. Total loading of PAHs to the lake from storm sewers in urban areas on the U.S. side of the basin was calculated at 550 kilograms1213 lbs/year.

In the years following this project, stormwater-permitting requirements have been established by the USEPA for larger communities. The Lake Superior stormwater project helped lay the foundation for stormwater planning and controls in Duluth, Minnesota; Superior, Wisconsin; and Marquette, Michigan. USEPA's next phase of stormwater regulations (Phase II) will extend requirements for erosion control and on-going stormwater management to industries and activities in areas in which one acre of land or more is disturbed. While these new requirements will help the Lake Superior environment, they enhance the need for education. The following projects to address those needs:

- The Village of LaPointe, Wisconsin has a stormwater demonstration project at a commercial development near the Madeline Island waterfront funded by Wisconsin Coastal Management.

- Wisconsin Department of Natural Resources and University of Wisconsin-Lake Superior Research Institute have a watershed education and stormwater outreach project to reach local officials and developers on the reasons for stormwater management to protect Lake Superior watersheds and fisheries (funded by WI Great Lakes Protection Fund).
- Superior, Wisconsin has a stormwater planning and education project. The local schools participate in educational events and have stenciled storm sewer covers with the message "Dump No Waste- Drains to Lake." The City also offers assistance to local homeowners for water management and has set up demonstration rain gardens and rain barrels. Wisconsin Great Lakes Protection Fund and the Great Lakes Commission have funded this work. The City is seeking funding for stormwater retention and treatment basins.

LaMP Habitat Projects in Wisconsin

A number of projects and activities are underway in Wisconsin to implement the ecosystem objectives of the Lake Superior LaMP.

Common tern habitat: In the fall of 2002 a new island was built for common terns -- a Wisconsin endangered species -- in Ashland. The Ashland colony is one of only two common tern nesting colonies in the entire Lake Superior basin. The other colony is located on Interstate Island in the St. Louis River estuary. In 2003 a slight increase in the number of nesting pairs using the new island was noted, with 90 pairs of terns nesting there. Production was one of the highest ever observed with nearly two young fledged per nest.

Iron River Habitat Restoration: In 2001, an abandoned hydropower dam was removed from the Iron River, about 1.5 miles above where it enters Lake Superior. What had been a warm water impoundment was restored to trout stream. The project took years to complete.The original hydropower dam was constructed in 1923 and was destroyed by later floods. In 2001, the remaining barrier was removed from the sandstone outcrop known as Orienta Falls, which old newspaper articles called the most scenic site in Bayfield County. At Orienta Falls, water drops 15 to 20 feet over a distance of 200 feet. Project partners include Xcel Energy (formerly NSP), which contributed about $500,000 to remove the remains of both dams. The Wisconsin DNR and the Great Lakes Fishery Commission paid for construction of a low-head barrier to keep sea lamprey out of the 56 miles of trout streams in the Iron River watershed. Until a management plan is developed, fish migration from Lake Superior will remain blocked. In the meantime, the river is returning to a more natural state. Below the former dam site, lake-run salmonids are reproducing once again.

Land Management and Stormwater: A project is being implemented in Wisconsin to develop best land management practice guidelines for the Wisconsin portion of the Lake Superior basin to reduce nonpoint pollution and stream damage. The project was funded by the Great Lakes Protection Fund and is being implemented by the Ashland, Bayfield, Douglas and Iron Counties' Land and Water Conservation Departments with assistance from Wisconsin DNR.

Wisconsin Lake Superior Partner Team

The Wisconsin Lake Superior Public Partner Team is a 40-member stakeholder group established in 1998 by the WDNR to advise state government on Lake Superior issues and to work with the state on Binational Program implementation.The group worked on recommendations for Lake Superior special designations for several years and provided recommendations to the DNR in 2002. The Partnership Team, a broad cross section of basin citizens in Wisconsin, including municipal and county elected officials, business and industry, and citizen groups, continues to work on initiatives to promote watershed health in the Wisconsin Lake Superior Basin.

Wisconsin Lake Superior Protection Fund

In 2001 the Wisconsin awarded $250,000 from the state share of the Great Lakes Protection Fund to 10 basin organizations to reduce mercury, prevent pollution, and support watershed based planning to reduce erosion and tributary degradation. The Lake Superior Partner Team helped establish the priorities for this funding: they set mercury reduction and small planning grants as the priorities for the $250,000 available for 2001. The Great Lakes Protection Fund is an endowment established by the Great Lakes states. Each year a portion of the earnings returns to each state for environmen-

tal cleanup and protection. Many of the projects discussed in the Lake Superior section of this report have been funded through this program.

Remedial Action Plans for Water Quality Restoration

Wisconsin is responsible for implementing remedial action plans (RAPs) at five Great Lake sites -- four on Lake Michigan and one on Lake Superior (Figure 29). At two of the RAP sites, implementation is a shared responsibility with adjoining states. For the Menominee RAP, Michigan and Wisconsin share responsibility for implementation. For the St. Louis and Duluth/Superior Harbor RAP, both Minnesota and Wisconsin are implementing recommendations that pertain to their authorities.

All of the five RAP sites are in the process of implementing the recommendations contained in the stage I & II planning documents. Actions are being implemented at each of the RAP sites that are aimed at restoring and protecting the designated uses in the Areas of Concern. At all sites work toward restoration of beneficial uses has become incorporated into the routine planning process and regular work activities of the basins in which the AOC is located. This 2004 report highlights three of the five areas of concern: the Lower Green Bay and Fox River, Sheboygan, and St. Louis River/Duluth Superior Harbor. Please see the 2002 report for a more extensive description of all five areas.

Figure 29: Wisconsin RAP Sites

Lower Green Bay and Fox River

Description

The Lower Green Bay and Fox River Area of Concern (AOC) consists of the lower 11.2 kilometers of the Fox River below DePere Dam and a 55 square kilometer area of southern Green Bay out to Point au Sable and Long Tail Point. The drainage area encompasses portions of eighteen counties in Wisconsin and 40 watersheds of the Upper Fox River, Wolf River and the Lower Fox River Basins, including the largest inland lakes in Wisconsin -- Lake Winnebago and its pool lakes. While water quality problems and public use restrictions are most severe in the AOC, water resources of the entire basin are affected by runoff pollution from rural and urban areas, municipal and industrial wastewater discharges and degraded habitats.

Eleven use impairments have been documented and two are suspected of being impaired for the Lower Green Bay and Fox River AOC through the Remedial Action Plan (RAP) process. Ecosystem services and human uses such as fishing, boating, swimming, hunting and passive recreation have been impaired. Soil erosion and runoff pollution cause most use impairments from upstream tributaries, persistent bioaccumulative contaminants in river and bay sediments, and habitat losses. Turbid, algae-laden waters degrade aquatic habitats and restrict swimming. Consumption advisories warn against eating mallard ducks and twelve species of fish. Shipping and navigation are impaired by sediment loading from soil erosion and the high cost of dredging and disposing contaminated sediments.

Despite incremental improvements to prevent water pollution, restore habitats, improve public access and further define the causes of impaired uses, none of the problems in the AOC have been completely resolved. Recommendations are being implemented sequentially with the easiest ones having been completed and the more difficult and costly actions yet to be implemented.

Highlights

Community leaders have established additional nonprofit organizations to promote implementation of nonpoint source pollution controls and to determine the most cost-effective actions to meet the nutrient and suspended solids objectives of the RAP. The following are remaining actions to

be implemented:

- PCB contaminated sediment remediation in 39 miles of the Lower Fox River (see below)
- Nonpoint source abatement/pollution and prevention including comprehensive watershed projects to abate runoff pollution, TMDLs for phosphorus and suspended solids in the Fox-Wolf basin, and riparian buffers throughout the Fox-Wolf basin are ongoing.
- Habitat protection and restoration that involve restoring an eroded chain of barrier islands and associated aquatic habitats (Cat Island archipelago), restoring littoral habitats, and protecting remaining wetlands
- Exotic species prevention
- Stewardship and sustainability which includes the Sustainable Green Bay Initiative
- Education and outreach
- Research and monitoring including the State of the Bay Report
- Public access enhancement

Fox River Remediation

Since the last report to Congress, the remedial action effort on the Lower Fox River/Green Bay site has advanced from the "evaluation and planning stages" to the "remedial action phase".

In 2002, DNR in cooperation with EPA, issued the Remedial Investigations Feasibility Study and Proposed Plan ("RI/FS") for public comment. Following the receipt of significant public input, the agencies issued a segmented Record of Decision (ROD). In June, 2003, the ROD for Operable Units 1 and 2 -- the upper 26 miles of the Lower Fox River segment of this site -- was issued. The selected remedy for OU-1 directs that all sediment which is contaminated in excess of 1 ppm PCB or which cover sediments with this concentration be dredged, dewatered, and landfilled. The estimated volume of sediment which would be removed is 784,000 cubic yards.

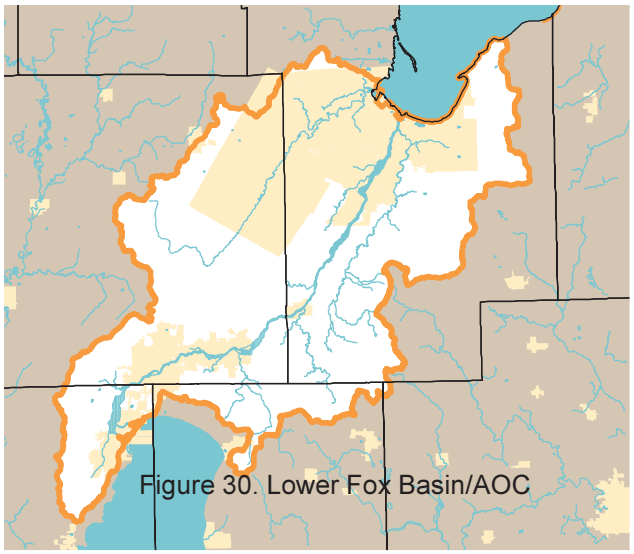

Figure 30. Lower Fox Basin/AOC

The implementation step began in June 2003, with the signing of an "Administrative Order on Consent" (AOC) by USEPA Region 5, Wisconsin DNR, and one of the Primary Responsible Parties (PRPs) identified for the site. The AOC ordered the PRP to conduct necessary fieldwork and prepare the remedial design for OU-1. This step was followed immediately on June 30, 2003, with the issuance of the ROD for OU-3, OU-4 and OU-5. The remedy selected in this ROD is very similar to the first ROD and identifies all sediment over the PCB concentration of 1 ppm to be removed, dewatered and landfilled. Because of advances in design and costing information, this second ROD also identifies vitrification, a process which melts the sediment and destroys the PCBs, as an alternative treatment and disposal method to be considered during design. The ROD also identifies desposits at the lowest end of OU-2 and at the mouth of the river in OU-5 to be remediated, as well as the estimated 6.5 million cubic yards of in-river sediment in OU-3 and OU-4.

On October 1, 2003 a consent decree was filed in federal court committing WTMI and the P.H. Glatfelter Company to fund implementation of the remedial action in OU-1. Following the public comment period, the consent decree was approved by the judge on April 12, 2004. Initial dredging will be done in Fall 2004, and full-scale remediation will begin in 2005. The remedial action is expected to take three to five years to complete. Food chain models predict that fish consumption advisories will begin to be relaxed within three years following completion of the remediation.

On March 5, 2004 an Administrative Order on Consent was finalized to accomplish the Remedial Design to implement the ROD for OU-2 through OU-5. Wisconsin DNR and USEPA Region 5 jointly

ordered Georgia Pacific and the NCR Corporation to develop this clean-up plan. The first step will be the collection of sediment characterization data. This data collection occurred summer 2004.

Sheboygan River and Harbor

The Sheboygan River Area of Concern includes the Sheboygan Harbor and 14 miles of the river up to the Sheboygan Falls Dam (Figure 31). The Sheboygan River, a tributary to Lake Michigan, was designated as a Superfund Site by U.S. EPA in 1985 because of PCB contaminated sediments. Tecumseh Products Company, Thomas Industries and Kohler Company have been identified as potentially responsible parties.

In May 2000, the Record of Decision for the Sheboygan River Superfund project was signed. About 4,300 cubic yards of contaminated sediment that had been previously dredged from the stretch of the Sheboygan River that runs from the area known as the "Upper River" and placed in steel storage facilities on the Tecumseh Products Company's Sheboygan Falls property, was shipped off site in September 2001. A consent decree was signed by U.S. EPA, U.S. DOJ and Tecumseh Products Company in 2003. This agreement requires Tecumseh to clean-up the upper portion of the Sheboygan River Superfund site including ground water at the Tecumseh facility, floodplain soil and river sediment. The Tecumseh facility clean-up is scheduled to proceed in 2004. River sediment characterization will be conducted in 2004 to complete a final remedial design for the floodplain and sediment clean-up. The river dredging and floodplain soil clean up phase is scheduled to begin in 2005.

Figure 31. Sheboygan Basin/AOC

WDNR staff is working with fellow trustees from U.S. Fish and Wildlife, and National Oceanic and Atmospheric Administration (NOAA) to determine the Natural Resources Damage Assessment for the restoration phase of the Sheboygan River Superfund Site. A sediment transport model was developed for the Sheboygan River Lower River and Inner Harbor reaches of the Superfund site to provide more information regarding the potential for scour of PCB contaminated sediment; this is an ongoing effort with EPA, ACOE and Baird.

C. Reiss Coal Peninsula on Lake Michigan and the Sheboygan River

DNR staff continues working closely with the City of Sheboygan and their consultants on the re-development of the former C. Reiss Coal Peninsula on Lake Michigan and the Sheboygan River. Elements include permitting for seawall re-construction on the Sheboygan River, remedial action plan for site cleanup, site grading permit, review of Lake Michigan revetment plans and a dune re-creation project. The city recently installed engineered stormwater devices to treat runoff from the newly developed areas on the peninsula. The city received a grant through DNR for a trail and fish cleaning station.

Other Basin Highlights

Dams

In the autumn of 2000, the Franklin Dam on the Sheboygan River was removed. The river is now free flowing in this reach and supports a more diverse fishery. For the last two years, DNR staff have been working with community members regarding the next dam downstream in Johnsonville. This dam on the Sheboygan River did not have an owner. Many local citizens are concerned about dam removal because they believe it prevents ice jams from forming downstream of their town. DNR is concerned this dam must be maintained or repaired, as it is a potential safety hazard. The Depart-

ment is attempting to locate an owner for the structure. Dam removal is an option that can be considered if no owner is found and citizen concerns can be addressed (ice jam study). Dam removal would also benefit fish and recreational uses of the river.

Volunteer and DNR Monitoring

There continues to be a strong volunteer monitoring effort in the Sheboygan area. DNR staff assist in the coordination and training of volunteers for both the "Testing the Waters" and "Water Action Volunteers" (WAV) groups. The former is an environmental educational program that involves area students from numerous local school districts. WAV is comprised of private citizens who volunteer to collect and analyze data to assess stream ecosystem health. Both groups continue to grow in capacity and technology for stream assessment. The Ellwood H. May Environmental Center of Sheboygan also continues to sponsor and assist with program activities for both groups. Several of the survey locations are within the AOC for the Sheboygan River.

Additional Activities, 2002-2004

- A canoe launch access site was constructed on the Sheboygan River along a county owned public trail. Another canoe launch is planned for the former Franklin Dam Impoundment on the Sheboygan River.
- WDNR assisted several municipalities and lake groups in determining techniques to control or reduce exotic species or nuisance levels of aquatic organisms (i.e. *Cladophora* sp., Eurasian water milfoil, elevated bacteria levels, etc.).
- WDNR helped fund Lake Michigan Beach Monitoring efforts by Sheboygan County through the use of a USEPA Beach Act grant.
- The *Broughton Sheboygan Marsh Strategic Management Plan 2001* was completed in 2001 and approved by the Sheboygan County Resources Committee in February 2002. This plan outlines mutually agreed upon responsibilities between the different units of government responsible for resource management throughout the marsh. A broad public process with representatives from local and county government, non-profit organizations, the WDNR and citizens at large were responsible for completing the plan. One key element to the plan was to have periodic complete drawdowns of the marsh to improve the biological diversity of the marsh and to stabilize cattails. A drawdown of the Sheboygan Marsh occurred in 2002. Sheboygan County and WDNR worked together to collect data during the drawdown including high quality color air photography before and after the drawdown. WDNR also worked with local conservation groups to establish a carp trap in the marsh. In early 2004, approximately 14 tons of carp were removed from the Sheboygan Marsh. WDNR is also pursuing an additional land purchase for the Sheboygan Marsh.
- Under Wisconsin's Source Water Assessment Program funded by USEPA as part of the Safe Drinking Act, assessments are completed for groundwater and surface water systems and include inventories of significant potential sources of contaminants to these system –ongoing;
- The Sheboygan County Land Conservation Department is working with WDNR and others on an update to the Sheboygan County Land and Water Management Plan. This plan is required by the State of Wisconsin for use of funds for the implementation of agricultural best management practices. The plan includes some joint strategies for implementing the state non-point pollution regulations. Priorities are being established for agricultural runoff practices near impaired waters and outstanding or exceptional waters in the county.
- In May 2003 WDNR staff conducted a stream monitoring workshop for the public that was concentrated on a small waterway named Willow Creek that is tributary to the Sheboygan River. The workshop included information on monitoring streams for habitat, water quality and biological community. This small stream supports a cool/cold water fishery including evidence of spawning by brook trout and coho salmon from Lake Michigan. The watershed is located in an area that will likely experience rapid urban development within the next decade.
- Sheboygan County Planning, UW-EX, and the Bay Lakes Regional Planning Commission continue to work with local units of government on comprehensive land use plans. WDNR assist these agencies with information for the natural resource elements of these plans. The county recently sent out a resident survey. In addition, they are developing a natural areas and critical

resource plan.

- WDNR issued municipal WPDES stormwater permits to the City of Sheboygan and the City of Sheboygan Falls in 2000. WDNR is also in the process of issuing WPDES permits for municipal storm sewer systems in the Town of Wilson, Town of Sheboygan and Village of Kohler. The permits require that these municipalities take action to improve the water quality of their storm water discharges.
- The Sheboygan River Basin Partnership is a consortium of local environmental and conservation groups, local business, local agency and government staff, and the public at large. The partnership is moving towards non-profit status and intends to raise funds that can be used to improve, restore or protect natural resources in the Sheboygan River Basin. The partnership has focused their resources on broad educational forums for residents in the Sheboygan area. In May 2003 they sponsored an educational forum on groundwater. In March 2004 they sponsored an educational forum on Lake Michigan bluff and dune erosion.
- The Sheboygan County Land Conservation Department continues to implement their stream buffer program for water quality improvement. Since the project began in 2000, the Land and Water Conservation Department has contracted with 40 landowners and installed more than 75 acres of buffer strips that reduce the amount of sediment and agricultural runoff from entering streams.

Onion River Stream Restoration Projects

The streams in the upper Onion River Watershed originate from numerous groundwater discharge points and have the ability to produce high quality water with temperatures suitable to support cold water species. Water quality in these cold headwater streams had declined since settlement because of agricultural operations, aquaculture (fish farming) and recreation. The Lakeshore Chapter of Trout Unlimited developed a strategic plan for restoration of the headwaters of the Onion River. The strategic plan encompasses both stream and watershed improvement combined with public acquisition. A number of stream and watershed restoration projects in the headwater areas of the Onion River Watershed are completed or underway to correct water quality problems and enhance habitat for fish and wildlife. Some of the actions that have occurred to date include:

- Removal of ponds and re-creation of natural, free flowing stream segments that are supported by springs.
- Relocation of an impacted 1,000 foot segment of the stream that was located adjacent to a farm operation and barnyard.
- Installation of in-stream fish habitat structures.
- Securing State funds (Targeted Runoff Management) for agricultural best management practices including manure storage.
- purchase 135 acres of land for public access and use

St. Louis River and Duluth Superior Harbor

The St. Louis River and Duluth-Superior Harbor area of concern includes 39 miles of the St. Louis River below Cloquet, Minnesota, the river estuary, Duluth-Superior Harbor and the lower Nemadji River. The area of concern straddles the Minnesota-Wisconsin border (Figure 32). Each state pursues implementation projects in their waters. The St. Louis River Citizens Action Committee, a local nonprofit organization that developed from the RAP citizens advisory committee, encourages implementation and facilitates coordination.

Stage 1 of the RAP, developed through a collaborative effort among the Minnesota Pollution Control Agency, the WDNR, and the Citizens Advisory Committee, identified nine of 14 beneficial uses as being impaired. Some impairments were associated with the physical loss and degradation of habitat, and with the lost of an estimated 7,700 of 12,000 acres of wetland and open water habitat in the estuary since settlement. Other problems were related more to pollution and toxicity. For years, the river smelled bad from industrial discharges. That changed in 1978, when the Western Lake Superior Sanitary District wastewater treatment plant began operation. Nevertheless, pollution continues to come from sources such as contaminated sediments, abandoned hazardous waste sites, poorly designed or leaky landfills, airborne deposition, industrial discharges, chemical spills, improperly sewered wastes and surface runoff.

Figure 32. St. Lois & Duluth/Superior AOC

Highlights

Contaminated sediments are an important priority in the AOC. Studies conducted by state and federal agencies in the late 1990s have provided a good understanding of the type, severity and location of contaminated sediments. These studies include work done at two Superfund sites on the Minnesota side. Recent accomplishments include the removal of 7500 cubic yards of PAH contaminated sediment and floodplain soils during the summer of 2003 from Newton Creek in the St. Louis River Area of Concern. Newton Creek flows through residential neighborhoods of Superior, WI into Hog Island Inlet of Superior Bay. Funding for this project was provided through the U.S. EPA Great Lakes National Program Office, Wisconsin Coastal Management Program, and the WDNR Harbors and Bays Remediation Program. WDNR is seeking funding to remediate contaminated sediment in Hog Island Inlet and restore this valuable shallow water and wetland habitat, which lies 1.5 miles from the confluence of the St. Louis River through Superior Bay to Lake Superior

Currently, the St. Louis River Citizens Action Committee is facilitating updates to a contaminated sediment strategy focusing on PAH contamination in the Area of Concern with initial funding provided by the WDNR. Also, the Minnesota Pollution Control Agency has recently developed a GIS-based contaminated sediment database for the St. Louis River Area of Concern with funding from U.S. EPA GLNPO. Funding to complete this project on the Wisconsin side are also being pursed.

Mercury is a contaminant of particular concern in the St. Louis River. The St. Louis River Watershed TMDL Partnership will develop a total maximum daily load (TMDL) for mercury. The TMDL process is designed to improve impaired waters like the St. Louis River, where all facilities with discharge permits are operating within their permitted limits, but have pollutant levels exceeding state standards. This process will complement the mercury-reduction efforts that are already ongoing in the watershed.

Habitat restoration and protection are also important priorities. The Area of Concern has tremendous habitat value including several extensive Lake Superior coastal wetlands. The WDNR together with the state of Minnesota, federal, and tribal agencies worked with the St. Louis River Citizens Action Committee to develop the Lower St. Louis River Habitat Plan, published in May 2002. It provides detailed habitat maps and a consensus list of conservation and management objectives, targets and actions.

Public involvement and outreach have always been important components of this RAP. A host of partners are working together to improve the St. Louis River. These include the U.S. EPA, Minnesota Pollution Control Agency, Minnesota DNR, WDNR, local and tribal governments, Minnesota and Wisconsin universities and Sea Grant Programs, the St. Louis River Citizens Action Committee, River Watch Project, River Quest, Harbor Technical Advisory Committee, U.S. Army Corps of Engineers and numerous private businesses and individuals.

Exotic Species

WDNR has an active role in the development of strategies to research, monitor, and control nuisance (exotic) aquatic species in Wisconsin's waterways. The WDNR in partnership with the University of Wisconsin Sea Grant Institute and UW Extension, and through the assistance of volunteers have developed a monitoring program.

Beyond reporting and tracking the presence of some of the more troublesome exotic species, the DNR actively participates in projects to study their effects on the ecosystem as well as develop strategies for their control. Wisconsin has developed a Comprehensive State Management Plan to

deal with this issue. The plan, developed in response to the National Invasive Species Act of 1996, provides the framework for a comprehensive state program to address the problems caused by invasive nuisance species. The scope of the activities are broad and aimed at preventing new introductions, controlling the spread of existing populations, and implementing abatement strategies to safeguard public health and the environment.

Specific initiatives involving exotics include development of ballast water management practices and standards, development of a rapid response initiative, a dispersal barrier project, and control of intentional introductions. These initiatives are designed to keep exotics from entering the Great Lakes ecosystem.

Chapter 6: Wetlands

In December 2000, the Wisconsin Department of Natural Resources Wetland Team developed *Reversing the Loss – A Strategy for Protecting and Restoring Wetlands in Wisconsin.* The Strategy charts a course for current and future Department policies and programs involved in wetland education, protection, restoration, enhancement and management. It established four major goals and performance measures to accomplish those goals by the year 2007. We are in the middle of implementing the Strategy and have made substantial progress in meeting some of the performance measures, however, there are also limitations to accomplishing others. Progress over the last two years on those goals and performance measures is described below:

"Reversing the Loss" – the Wetland Strategy

Goal 1 Strengthen relationships with property owners, nonprofit conservation organizations and local governments

Over 75 percent of the state's wetlands (over 4 million acres) are in private ownership. The department will need to enlist wetland owners, nonprofit conservation organizations and local governments in preserving and restoring wetlands on private property while sustaining agriculture, forestry, recreation and other wetland uses including development when compatible with wetland health. An established dialogue with wetland owners, and focused outreach, education and incentives along with technical assistance, will be necessary components to make this strategy work.

Goal 1 Performance Measure: Public Outreach

Wetland Restoration Handbook for Wisconsin Landowners, 2nd Edition

The second edition of the Wetland Restoration Handbook for Wisconsin Landowners has recently been published by the DNR's Bureau of Integrated Science Services. The handbook is a collaboration between the DNR and the Wisconsin Wetlands Association, a nonprofit organization. The handbook describes the fundamentals of wetland restoration in an interesting way. New chapters that have been added since the first edition include seeding and planting considerations, invasive species control information, wetland management recommendations, additional photographs and enhanced graphics. There is an expanded reference section of useful internet web sites, flora and fauna guides and a new statewide contact list.

Restoration workshops

Wisconsin Wetlands Association and Wisconsin Waterfowl Association held wetland restoration workshops with assistance from a US Fish and Wildlife Service grant in collaboration with DNR. These workshops were geared toward landowners and land managers interested in restoring their own wetlands.

Wetlands Internet Web Site

DNR continues to update the Wetlands web page as new information of interest becomes available. Some of the most significant changes include the addition of a Wetlands Mitigation page and